

EVOLUTION

AND THE

WORLD TODAY



VEST DAVIS



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PREFACE

This book is not just a hasty product of the moment. For several years the author has been collecting material for the purpose of presenting a summary of modern scientific and historical knowledge in language that can be understood by the average person. The results of his efforts are published at this time for the benefit of the ordinary person who wishes to acquaint himself as quickly as possible with the views of scientists on the vital questions now so much discussed.

The author has made a studious effort to summarize in a brief and easy-to-read treatment the theories and achievements of modern learning without resorting to ambiguous platitudes or sweeping generalizations that scientific proofs will not justify.

The drawings by Mr. Marshall Reed represent considerable research and effort, and the author is greatly indebted to him for them.

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THERE IS NO END TO SPACE IN THIS DIRECTION

THE MILKY WAY

ABOUT 2500 STARS CAN BE SEEN WITH THE NAKED EYE ON A CLEAR NIGHT IN THE NORTHERN HEMISPHERE AND ABOUT THE SAME NUMBER IN THE SOUTHERN HEMISPHERE, OR ABOUT 5000 IN ALL. HOWEVER, ABOUT A MILLION CAN BE SEEN THROUGH TELESCOPES, AND THERE ARE PROBABLY MANY MILLIONS THAT ARE TOO FAR AWAY TO BE SEEN THROUGH THE MOST POWERFUL TELESCOPE.

(THOUSANDS OF STARS WHICH SEEM CLOSE TOGETHER BUT ONLY BECAUSE THEY ARE SO FAR AWAY FROM US.)

THE EARTH IS 93,000,000 MILES FROM THE SUN, AND NEPTUNE, THE FARTHEST PLANET IS REALLY OVER TO TIMES AS FAR.

NEPTUNE (WITH ONE MOON)

SATURN
(WITH RINGS AND TEN MOONS)

JUPITER (WITH NINE MOONS)

PLANETOID
(VERY SMALL PLANETS)

VENUS

EARTH (WITH OUR MOON)

MERCURY

THE SUN (A BURNING STAR)

THE SUN IS REALLY OVER A MILLION TIMES AS LARGE AS THE EARTH

MARS
(WITH TWO MOONS)

URANUS (WITH FOUR MOONS)

THERE IS NO END TO SPACE IN THIS DIRECTION

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ALPHA CENTAURI, THE NEAREST STAR IS 25,000,000,000,000 MILES FROM THE EARTH. IN ORDER TO HAVE OUR DIAGRAM SHOW A TRUE COMPARISON OF THE DISTANCE BETWEEN THE EARTH AND SUN AND THAT BETWEEN THE EARTH AND ALPHA CENTAURI OUR PAPER OUGHT TO BE LARGE ENOUGH TO MAKE THE LATTER 250,000 TIMES AS GREAT AS THE FORMER.

THE STARS ARE NOT STILL THEY PROBABLY WHIRL AROUND IN CIRCLES, HOWEVER, SINCE THEY HAVE BEEN WHIRLING ABOUT ALL OF THEIR LIVES AND ARE FAR APART, MOST OF THEIR COLLISIONS ARE OVER WITH.

THERE IS NO END TO SPACE IN THIS DIRECTION

Drawn by Marshall Reed

OUR PLACE IN THE UNIVERSE

There is really no center to the universe because there is no end to space in any direction.

CHAPTER ONE

HOW THE EARTH AND STARS BEGAN

*"One Sun by Day, by Night ten thousand shine
And light us deep into the Deity."* Young.

*"In the beginning God created the heaven and
the earth. And the earth was without form
and void."* Genesis 1:1, 2.

Two Kinds of Stars

When you first looked at the stars on a clear night, I am sure you thought they were much alike with only a slight difference in size. As a matter of fact some of them are blazing balls of fire like the sun, while others are cold and more solid lumps like the earth and moon. These cold stars reflect the light of the sun just as the moon does; but they are further away than the moon and, so, seem smaller. All the burning stars are much further away than the cold stars; but they are much larger, also; and, so, they all look to be about the same size and about the same distance away from us. There are both cold and burning stars which we cannot see, however, because they are too small or too far away.

If you lived on Mars or Venus, which are two cold stars that look large and bright to us, the earth on which we live would look just like these two "stars" when we look at them at night. It is interesting to know which star is Mars, and which is Venus, and so on. Our earth and seven other "stars" are different from all the others you can see. For a long time men have noticed that Mercury, Venus, Mars, Jupiter, and Saturn occupy different positions among the other stars in spring, summer, autumn, and winter. So they are called *planets*, which means *wanderers*. Perhaps a teacher or some one else you know can show you some of these planets some night. Astronomers now know that our earth and the five planets which

we have just mentioned as well as two other planets (Uranus and Neptune), which cannot be seen without a telescope, and a number of very small starlets (asteroids) are all cold stars which float around the sun in circles just as if they were toy balloons tied to it with strings and had to whirl around it because it turns around.

Relations between Heavenly Bodies

The force which seems to tie the earth and the other planets to the sun is a sort of wireless force which men call "gravity." Every star seems to "pull" every other star towards itself. The big or heavy stars pull the smaller stars towards them and sometimes capture them just as the earth "pulls" an apple down to it, if the apple is broken from a tree. At the same time all the stars are tending to fall away from each other, too. None of them is still. They are falling and falling. They can never reach the bottom of space, for really there can be no limit to space in any direction. No matter how far up, or down, or out we could imagine ourselves to go, there would always be more and more space beyond that place. The stars, and the sun too, fall, we think, in circles or nearly in circles. They all pull on each other by gravity, but they have been falling for such a long time that perhaps most of their collisions are over with, and now they go on falling around and around in regular paths without colliding very often.

One reason there are not more collisions between stars is the fact that they are all many millions of miles apart. There is a diagram on another page in this book which helps to explain the location and size of the earth in comparison with the sun, moon, planets, and burning stars. In this diagram the sun and its planets are placed near the center, but we are not sure whether they are in the center of the universe or not. Really we can't say that there is any center to the universe, for we could never reach the end of it in any direction.

Laplace's Theory of the Earth's Origin

We know that our earth has been a cold star for millions of years although we cannot calculate its age exactly. Some astronomers once thought that our earth was at one time so hot that the very rocks were not only boiling but were a sort of fiery steam or burning gas. They thought that the sun and its planets with their moons were once one huge burning mist or cloud revolving around a center somewhat like a "pin-wheel" which children like so well to see when they can have fire-works. A great French scientist named Laplace first fully thought out a theory of how the earth and the other planets began. He thought that this fiery mist gradually cooled off and formed several cloud-rings each revolving around the center which became our sun. Each of these rings, he thought, further cooled off and condensed until it became a planet. According to Laplace the earth, just at the time it became a real planet, must have been a white-hot lump which has kept cooling off until now it would be icy cold if it were not for the warm sunshine it gets from the sun which holds it captive by the attraction of gravity. According to this theory the sun also would be cooling off and becoming smaller and smaller, and cooler and cooler, until some day after millions of years it and its planets, including our earth, would become ice-cold lumps and lifeless meteors which might become what we call shooting stars if they should fall near enough to some other star to burst into a flame. You must understand that all this is just a big "guess" as to how the earth and the sun began. It is called Laplace's Nebular Theory or the Nebular Hypothesis. Our word, nebular, comes from a Greek word "nebula" which means a cloud.

Planetesimal Theory of the Earth's Origin

Scientists now think that Laplace was not entirely correct in his guesses. However, his method of reasoning, it seems, was undoubtedly correct. A theory now believed to be an improvement upon the Nebular Theory is one called the Planet-

esimal Nebular Theory. According to it the sun and planets may at one time have been a mist, not exactly of burning gas, but of millions of small particles of dust which whirled around and around in a disc-shaped cloud, white-hot from continually bumping into each other but consisting of matter too solid to burn up altogether. It is possible even that the earth was once a part of the sun and that it became separated from it on account of some sort of an explosion of the sun, caused by the sun coming accidentally too near some other star. Some astronomers think that if there was once such an explosion of the sun that certain parts of the original sun's material became a cloud of particles or little planets revolving around the sun. Of course some of them bumped into each other. Lumps may have been formed by particles sticking together. Perhaps some of the lumps were very large even at the beginning. Our earth may have been only a tenth or a hundredth of its present size. We don't know the truth as to that. Perhaps it gradually increased in size by drawing to itself the little planet-like particles and lumps of matter in its path around the sun until it doubled its size several times. Even now a few very small meteors come bumping into the earth, and if they are too hard to burn up, they can be found after they hit the ground. This theory of the earth's origin is called the Planetesimal Theory because it assumes that the earth and the other planets grew out of very small planet-like bodies or planetesimals.

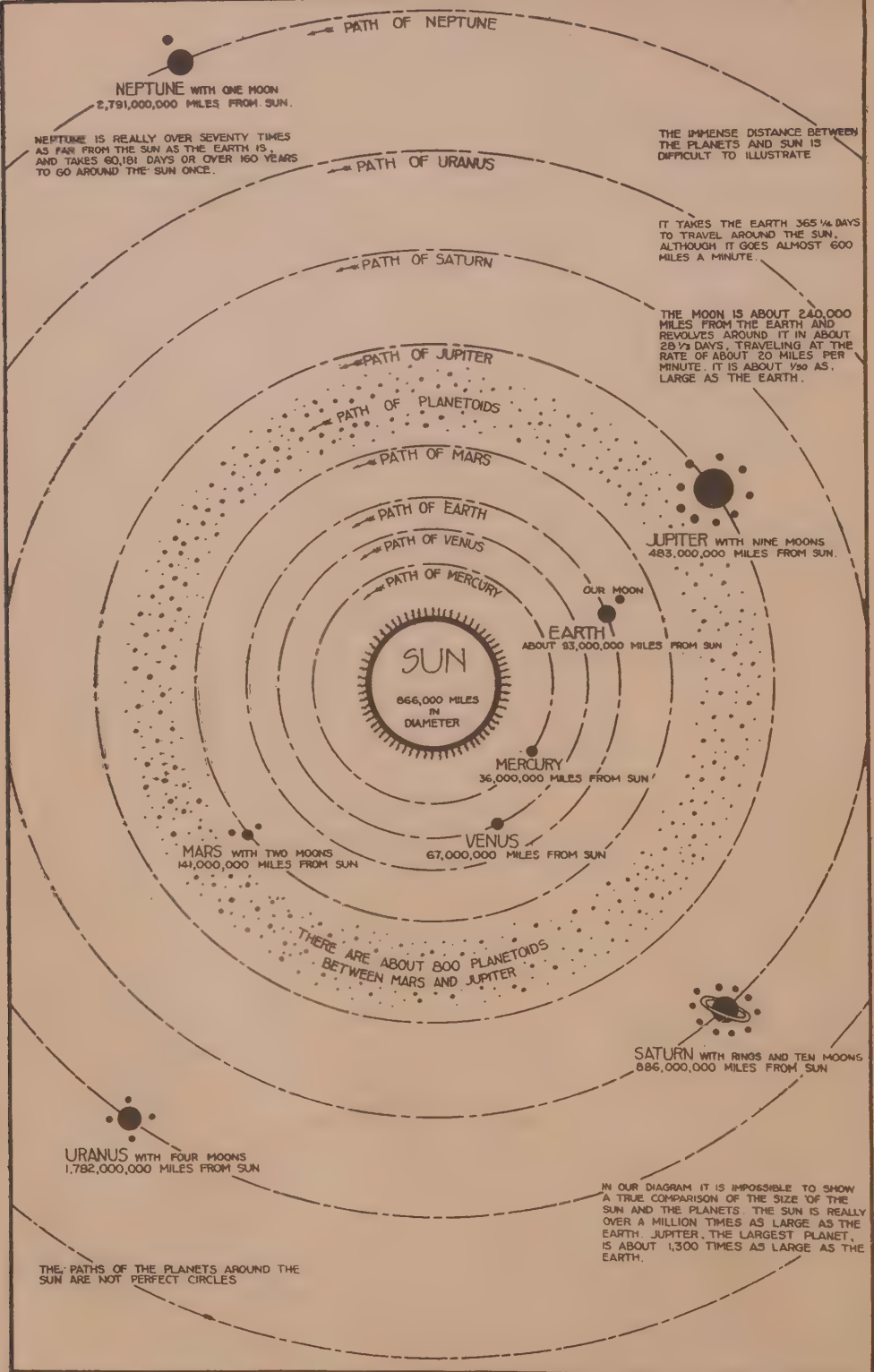
Astronomers studying the heavens through their telescopes have found several whirling clouds of fire-mist appearance, which they think may sometime develop into suns with planets revolving around them. It was while studying these star clouds or "nebulae" that the theories of the origin of the sun and its planets were thought out. In a few years, perhaps, some better explanation of the origin of our solar system may be thought of.

No Theory of the Earth's Origin Can Be Final

We do not know where the material of which the sun and planets and stars are composed originally came from. It is hard even to think of any reasonable scientific guesses as to how this material came to be. The origin of the stars and planets and the marvelously orderly way in which they have developed into their present condition and arrangement will always be a supreme mystery to men. Scientific and religious thinkers can never solve the whole mystery. Yet, how interesting are the details which they can explain!

There is a religious and beautifully poetic account of the beginning of the world in the first chapter of Genesis, the first book in the Hebrew Bible. Some people think this account intends to teach that the world was created step by step, or age by age, and that there were five or more of these ages or periods before God created human beings. Thus they say the teaching of Genesis is similar to that of modern astronomers and geologists but is expressed in poetic and religious language.

I would not advise you to enter into a discussion of the Bible in a class at school, as our American public school teachers are not expected to teach their religious views to their classes. However, I think you will be interested in discussing the relation between science and religion with your parents, or with some clergyman or teacher you know. Do not be discouraged if you cannot understand all their views; man's search for the truth will probably continue forever because the whole truth can never be known.



THE SOLAR SYSTEM

Drawn by Marshall Reed

Consisting of the sun and the planets, moons, and planetoids that revolve around the sun.

CHAPTER TWO

HOW THE EARTH MOVES THROUGH SPACE

"It used to be thought that the great fire of the sun was put out every night in the water of the West, and that then, in some mysterious way, it passed through the underworld, and was set blazing again, and turned up next morning in the East to begin its journey afresh. The notion that the earth itself moved seemed to be such nonsense that everybody laughed at it."

The Book of Knowledge.

The Earth Revolves around The Sun

We have said that the earth and the other "cold" stars called planets are revolving around the sun as if they were toy balloons tied to it just as toy balloons would whirl around a wheel if they were tied to it and someone should turn the wheel around and around. We have said that the planets are "tied" to the sun by a sort of "wireless" force or magnetic attraction called "gravity". The sun truly "pulls" the planets towards itself much as a magnet pulls nails towards itself. You might think that the sun is big enough to pull the earth all the way to it just as the earth "pulls" a falling airplane to itself. However, the earth and the other planets are moving rapidly and seem to be trying all the time to fall off into space away from the sun. Although the sun can pull on them strongly enough to hold them captive and keep them whirling around itself, perhaps it cannot pull them all the way to itself on account of the momentum or start they have. At any rate we know that the earth whirls around the sun once a year in a sort of circle called an ellipse. An ellipse is a sort of oblong circle with two centers called focuses (or foci).

It also Rotates or Spins like a Top

The earth not only revolves around the sun once a year but also spins around and around like a top. As the earth spins around once in twenty-four hours, any certain place on it might be expected to be in darkness half of the time, for the earth is almost an exact sphere and the sunlight can reach only one-half of it at a time. This accounts for our days and nights. You might expect the days and nights each to be always twelve hours long at any place on the earth. However, the earth as it spins seems to be always at a slant or angle with regard to the sun. Let me explain this by again comparing the earth to a top. You have, perhaps, seen tops that spin at a slant instead of remaining straight up and down. The earth spins with the north pole at a slant; as it goes around the sun, its north pole leans toward the sun part of the time and leans away from it part of the time. In fact, the earth spins and revolves around the sun just as a top might be made to "walk" around a lamp. Now, if you drive a nail or pin through a top from its top to the bottom, and if the top spins smoothly, this nail or pin will stay in practically the same position while the rest of the top spins around it. We might call the nail or pin the axis of the top, and the top and bottom of it might be called the north and south poles of the top. There is of course no line or rod or anything of the sort running through the earth from the north pole to the south pole; but we can imagine that there is such a line, and we call it the axis of the earth because the rest of the earth spins around it from west to east once in every twenty-four hours.

Slant of Earth's Axis Causes Summer and Winter

The fact that the axis of the earth remains always at a slant accounts for the different seasons of the year as well as for the fact that the days and nights are not always the same length except at the equator. June 21 is the longest day of the year in the northern hemisphere because at that time the north pole points towards the sun at a greater slant than it does at any other time. During summer the sun shines both day and

night on that part of the earth near the pole. This part of the earth is called the land of the midnight sun. In the northern parts of Norway, Sweden, Russia, Siberia, Alaska, Canada, and Greenland during several weeks before and after June 21st, each summer, the sun may always be seen just above the horizon. At the north pole the sun may be seen for full six months. Norway and Sweden are the only northern countries with large populations and to them most frequently is the name, the Land of the Midnight Sun, applied. In May, June, and July in all parts of the earth north of the equator the sun shines more than half of each twenty-four hours. Correspondingly, south of the equator the days are shorter at this time than the nights, and at the south pole the sun cannot be seen at all for six months between March and September. People in the southern hemisphere are having their winter while we have our summer.

If we again imagine the earth spinning around on its axis like a top and at the same time "walking" around the sun until it gets to the opposite side of it, still slanting at the same angle, we can understand how things are exactly the reverse on December 21st, from what they are on June 21st. In winter from September to March the north pole is in darkness. On the rest of the earth north of the equator they are having winter, and the nights are longer than the days. However, in December the days are as long in Australia and Argentina as they are in June in North America and Europe. Christmas weather in Australia and Argentina is like Fourth of July weather in the United States.

In spring and autumn the days and nights are of equal length because at that time the north pole does not point either towards or away from the sun. We may say that the sun shines directly on the "sides" of the earth. During September and March the days and nights are everywhere, in both northern and southern hemisphere, about twelve hours in length.

At the equator at all times of the year the days and nights are the same length. Here it is summer all the year round, al-

though there are wet and dry seasons corresponding to summer and winter. One reason it is so hot at the equator is because the rays of sunshine come directly down upon that part of the earth at noon time during all periods of the year. The sun is directly overhead every day at noon. As we go away from the equator towards the north or south we find that the sun is overhead at noon during only part of the year. Summer and winter, or hot and cold seasons, are due partly to the angle at which the rays of the sun strike the various parts of the earth as well as to the length of time during each twenty-four hours that the sun shines.

Simple Proofs of the Earth's Revolution and Rotation

I wonder if there are any readers of this book who do not believe that our earth spins around on its axis every day or that it revolves around the sun every year. Do you know of people who believe that the sun and all the stars as well as the moon revolve around the earth every day? They may think it is absurd to say that the earth travels around the sun at the speed of a million miles a day. However, do you see that if you should claim that the sun travels around the earth every day you would be claiming that the sun could travel as far in a day as scientists claim the earth does in a year? The sun is 93,000,000 miles from the earth. If it could travel around the earth in one day it would have to go over 300,000,000 miles in twenty-four hours. Furthermore, if you should suppose that all the stars travel around the earth every twenty-four hours, you would indeed have to admit that their speed would be much greater than the rate of a million miles a day which scientists claim for the earth in its journey around the sun.

Some people may still believe that the earth is not round. They may think it is impossible for some people to live on directly the opposite part of the earth from other people. I think the fact that people do live on directly opposite sides of the earth is shown by their experiences in looking at the stars. Every night people in Australia, South Africa, and South

America, see stars which are never seen by those who live in Europe and North America. Nor can the north star, the big dipper, and many other groups of stars to be seen by people north of the equator be seen by those living south of the equator.

In order to understand this we may refer again to the comparison of the earth to a top that is spinning on its axis and "walking" around the sun. The earth spins around on its axis from west to east. At some time during the year a person at the equator may see all the stars that shine brightly enough to be visible. However, since the north pole always points towards the north star and the south pole points in the opposite direction, people who live at some distance north of the equator can see one-half of the stars while those south of the equator see only the other half.

The Moon Revolves around the Earth

As the earth revolves around the sun once in about 365 days, so the moon revolves around the earth once in 28 days. This sometimes causes interesting occurrences called eclipses of the sun and moon. Perhaps you have seen an eclipse either of the sun or of the moon. You will readily understand that an eclipse of the sun occurs when the moon comes between us and the sun. This shuts off the sun's light. If we look through a smoked glass, we see the part of the moon that hides a part of the sun. It may look as if someone has taken a "bite" out of the sun. If the moon passes directly in front of the sun so as to hide all of it, the shadow of the moon upon the earth causes temporary darkness. This is called a "total eclipse" of the sun.

If the earth passes directly between the sun and moon, its shadow falls over part or all of the moon. Now the shadow of the earth upon the moon during an eclipse is always circular. This is definite proof of the spherical shape of the earth as only objects shaped like a ball or sphere cast shadows that are always circular.

THE RECORDS IN THE ROCKS

ERAS

PERIODS

PLANTS

INVERTEBRATES

VERTEBRATES

CENOZOIC
(RECENT LIFE)

QUATERNARY
MAMMALS PREDOMINANT
MAN SURVIVES TO PRESENT

TERTIARY
MAMMALS PREDOMINANT

CRETACEOUS
REPTILES PREDOMINANT

MESOZOIC
(INTERMEDIATE LIFE)

JURASSIC
REPTILES PREDOMINANT

TRIASSIC
REPTILES PREDOMINANT

PERMIAN
FISH PREDOMINANT

UPPER
CARBONIFEROUS
FISH PREDOMINANT

LOWER
CARBONIFEROUS
FISH PREDOMINANT

PALEOZOIC
(ANCIENT LIFE)

DEVONIAN
BEGINNING OF
PREDOMINANCE OF FISH

SILURIAN
INVERTEBRATES
PREDOMINANT

ORDOVICIAN
ANIMALS NEARLY ALL
INVERTEBRATES
BEGINNING OF VERTEBRATES
OSTRACODS AND
PROBABLY LAND PLANTS

CAMBRIAN
INVERTEBRATE ANIMALS
AND SIMPLE THALLOUS
PLANTS ONLY

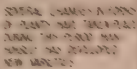
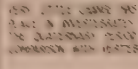
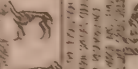
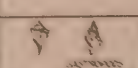
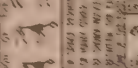
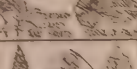
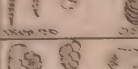
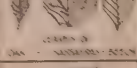
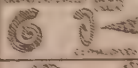
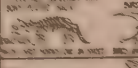
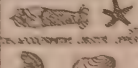
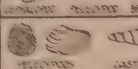
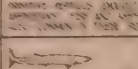
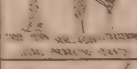
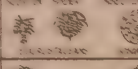
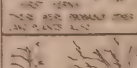
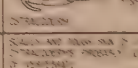
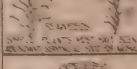
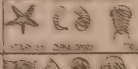
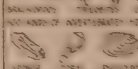
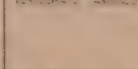
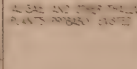
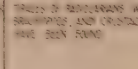
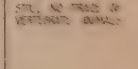
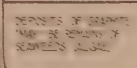
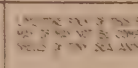
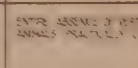
PROTEROZOIC
(PRIMITIVE LIFE)

ALGONKIAN
SIMPLE MARINE LIFE ONLY

ARCHEOZOIC
(EARLIEST LIFE)

ARCHEAN
PROBABLE ORIGIN OF LIFE

THICKNESS OF ROCK LAYERS

PLANTS	INVERTEBRATES	VERTEBRATES
 SEVERAL CHANGES IN FORM OF PLANTS AND TREES HAVE TAKEN PLACE SINCE THE FIRST PLANT WAS DEVELOPED AND PLANTS HAVE DEVELOPED NEW METHODS	 ONLY LITTLE CHANGE HAS TAKEN PLACE IN INVERTEBRATE FORM SINCE THE OLDEST KNOWN SPECIES IN COMPARISON WITH VERTEBRATES	 THE FIRST VERTEBRATE TO FORM WAS A FISH. IT WAS A SIMPLE, SLIM, FISH-LIKE ANIMAL WITH NO BONES. IT WAS THE FIRST OF A LONG LINE OF ANIMALS THAT WERE TO FORM THE VERTEBRATE SERIES.
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PARTS OF ANIMALS OR PLANTS FOUND IN ROCKS ARE CALLED FOSSILS. FOR MILLIONS OF YEARS PLANTS AND ANIMALS, LIVING IN OR NEAR THE SEA, HAVE BEEN LEAVING THEIR REMAINS IN THE ROCKS. THE REMAINS OF THESE ANIMALS AND PLANTS, WHEN SIMPLY BURIED, ARE CALLED FOSSILS. IT SEEMS STRANGE THAT MUCH OF OUR COMMON ROCK IS MADE UP ALMOST ENTIRELY OF THE SHELLS AND BONES OF SEA ANIMALS. SINCE LOWER ROCK LAYERS MUST BE OLDER THAN THOSE FORMED ABOVE THEM, AND GRAPHERS, BE UPPER LAYERS, DESCENDED FROM SIMILAR ORIGIN, IN LOWER LAYERS, QUARTZITE, HAVE BEEN ABLE TO PUT TOGETHER THE "EVOLUTION" OF HIGHER ANIMALS AND PLANTS FROM SIMPLY BURIED FOSSILS.

Drawn by Marshall Reed

EVOLUTION AS RECORDED BY FOSSILS IN THE ROCK LAYERS

The oldest layers are shown at the bottom with the later layers in order above them. Read the diagram from the bottom upwards.

CHAPTER THREE

EVOLUTION AS TOLD BY THE ROCKS OF THE EARTH

*"All that tread
The globe are but a handful to the tribes
That slumber in its bosom."*

W. C. Bryant's "Thanatopsis".

In this chapter I hope to explain: (1) why I think the exact truth about the age of the earth will never be known by man; (2) why I agree with those who think that the earth has existed for many millions of years; (3) my opinion in regard to the guesses as to how the first beings (plants and animals) came to exist; (4) my concurrence in the belief that the many kinds of plants and animals now on the earth (including human beings) have by some process of development or evolution descended from fewer and simpler kinds of beings that lived on the earth before them. The Author.

How We Can Guess the Earth's Age

Perhaps you have already wondered how long it has been since the earth became a planet and how long the universe had existed before the earth came to exist as a planet revolving around the sun. Maybe you think the earth has been revolving around the sun since the beginning of time. We don't know all about these things but I shall tell you what scientists think about them.

In the first place there never was any beginning of time so far as I can imagine. I think there was a long stretch of time during which the material of which our earth was composed was a part of the sun or scattered out in space. I think we shall never know the true origin of the earth. I think man can never figure out exactly how long our earth has been revolving around the sun. I *do* think it has been a planet for many millions of years.

You may wonder how anyone would measure the age of the earth. Indeed, they cannot measure its age very exactly, but they have made some interesting guesses about it. Many astronomers have made such estimates, and so have many geologists. A geologist is a person who studies the different kinds of rocks and soils of which the earth is composed. He tries to explain how rocks, canyons, mountains, etc., were formed. He also guesses how old the various rocks are; and, so, he studies the question of the age of the earth. Astronomers, as you doubtless know, study about the stars.

One of the first famous estimates of the earth's age was that of Lord Kelvin, an English astronomer. He presumed that the earth was once a white-hot mass (which was only a guess, of course) and that its average rate of cooling has always been about the same as the present rate at which it seems to be losing heat. After much study he gave it as his opinion that the earth had been a planet about 20,000,000 years.

The geologists claim that the earth has been a planet longer than that. Their estimates are based upon the length of time it must have taken to form all the sedimentary rocks on the earth's crust. Sedimentary rocks are those made up of sediment or settlements at the bottom of lakes or the ocean. From their examination of rocks the geologists believe that nearly all of our common rocks such as limestone and sandstone must have been formed at the bottom of the sea. They are made up of sand, shells, mud, and other materials that sink to the ocean's bottom. It must take a very long time for a layer of this matter several thousand feet thick to be washed into the ocean by rivers, to settle on the ocean bed, and be turned into hard rock by the pressure produced by its own thickness or in some other way. It must also take a long time for a layer of limestone rock several thousand feet thick to be formed out of the shells of little sea animals that fall to the bottom of the ocean when they die. Perhaps most of the geologists nowadays think that the earth has been a planet for at least 100,000,-

000 years and that sedimentary rock formation has been going on for at least that long.

Interesting Facts about Rocks

Geologists have discovered many remarkable facts about the earth. The cliffs you see along our rivers and the rocks of our mountain ranges must at one time have been at the bottom of the ocean, for these cliffs and mountain rock-layers must have been made up of the slowly settling deposits on the bed of the ocean. Think of the ages it must have taken to form the rocks of the grand canyon of the Colorado River which are over a mile thick. It is remarkable, too, that for alternate thousands of years large parts of North America and all of the other continents have been above and below the ocean level. This fact helps to explain the formation of coal which is composed of plants partly baked and petrified. These plants grew in swampy ground. Some of them were a hundred feet high although they were different from our trees of today. Millions of these plants lived and died and left their trunks piled up in huge masses. Then for some mysterious reason, whole districts of these ancient forests must have sunk below sea level. The waters of the ocean poured over them forming lakes or seas. Slowly the masses of tree trunks were covered with foot after foot of mud and other sediment until finally the pressure was so great that the remains of the plants and trees became pressed and baked into the kind of rock we call coal. Much oil and gas were squeezed out of these plants or otherwise formed in this coal-making process.

The great earth changes that lifted continents out of the ocean or caused them to sink beneath the water of the seas were often very gradual although, perhaps, there have been violent earthquakes in the past that surpassed any ever witnessed by human beings. Until recently the geographies and geology books explained the great earth movements by saying that the earth was once very hot and that as it cooled off its crust became wrinkled just as does the peeling of an apple

when it dries up. Now, however, many of the leading geologists think that the earth has been growing in size since it became a planet instead of shrinking. They think the huge wrinkles on the earth which we call mountain ranges were squeezed up by the pressure of huge masses of earth on each side of them.

Bit by bit during the last hundred years the geologists have been putting together the story of the rocks of the earth and of the creatures that have lived on it. They have been assisted much by two facts. The first of these is the idea that when several layers of sedimentary rock are found one above the other it seems certain that the bottom layer is the oldest unless some earthquake has upset the original arrangement. The other fact is the existence of thousands of parts of plants and animals within these layers of rocks. These remains of plants and animals are called fossils and they include skeletons and broken bones of animals, shells, tracks, petrified leaves or whole trunks of trees, and other traces of plants and animals embedded in the rock.

The oldest kind of sedimentary rock found in North America is very similar to the oldest sedimentary rock in Europe. It has been estimated that the layer of this rock which forms the greater part of Canada is from 30,000 to 100,000 feet thick. Its formation took ages upon ages. But a long time must have elapsed since this particular kind of rock was formed because in parts of the earth where this formation became depressed so that it lay on the bottom of the ocean, thousands of feet of newer sedimentary rock have been formed on top of it.

Do you wonder, now, that I am convinced that our earth is many millions of years old?

The Theory of Evolution

The geologists not only guess at the age of the different layers of rock; they examine the fossils in the most careful manner. As a rule the plants and animals whose remains were found in the lower layers of rocks should be older than,

and ancestral to, the forms found in layers above them. There is, to be sure, the world-wide truth that there is nothing new under the sun; things that appear new are just old materials in new forms. By applying this rule the geologists, after studying the remains of old plants and animals found in the rocks of the earth, came to the conclusion that all the complex plants and animals to be found now have been created by nature from simpler creatures just as many improved varieties of domesticated plants or useful plants have been developed by men from simpler wild forms.

Reasoning in this way scientists discovered the fact of the evolution of the higher animals and plants from simpler creatures. Then they set out to discover the method, or methods, by which the evolution of new forms of life came about. In 1859 the English scientists, Charles Darwin and A. R. Wallace, thought out at the same time a theory of evolution by "natural selection." Darwin's book on this subject is called "Origin of Species." In this book Darwin wrote: "By the theory of natural selection (the method by which Darwin thought evolution took place) all living species have been connected with the parent species of each genus (group of similar species) by differences not greater than we see between the natural (wild) and domestic (tame) varieties of the same species at the present day; and these parent species, now generally extinct, have in their turn been similarly connected with more ancient forms; and so on backwards, always converging to the common ancestor of each great class." The details of Darwin's theories may be disputed, but the great idea of evolution is fundamentally true.

Those who believe in evolution do not think that men are descended directly from chimpanzees or gorillas or any other modern form of apes. However, they do think that men and these apes are both descended from the same parent species of ape-like creatures that lived on the earth thousands of years ago.

Periods in the Earth's History

For millions of years our earth has been revolving around the sun, changing only a little day by day as a rule although there have been periods of terrific earthquakes and earth-wrinkling. The long development of rocks, continents, life-forms, etc., may in a way be compared to the clearing and settlement of America by the white race. America is not very different today from what it was yesterday, or last week, or last year. But, if we should compare its condition now with that of several decades or centuries ago, we would notice a vast difference. Upon further study we could decide that there were clearly defined periods in U. S. history such as the period of exploration, the period of settlement, the period of inter-colonial rivalry, the revolutionary period, the period of early national development, the civil war period, the reconstruction period, etc. Similarly, the geologists have discovered and defined certain periods in the earth's history such as the age before living creatures existed, the age of one-celled creatures, the age of sea weeds and ocean invertebrates (animals without any backbone), the age of shell fish, the age of true fish, the age of amphibians and lycopods (certain kinds of plants resembling ground pines), the age of reptiles, the age of mammals and modern plants, and the age of man. As I have already explained *knowledge of* these periods is based upon a study of the age of the different layers of rock and of the fossils they contain. It would take a thick book containing many difficult words to tell you the details concerning them. I shall try to tell you enough about these periods in the earth's history to make plain the main facts and theories believed in by geologists.

Scientific Guesses Concerning the Origin of Life

You may wish to know what the best scientific guesses are as to how living creatures came to exist at all. One interesting guess is that the germ of life came through space from some other planet or star and accidentally fell upon the earth milli-

ons of years ago. Most scientists think this is highly improbable. The best guess I have heard concerning this is that as soon as the elements of which living things are composed became properly mixed, and the moisture of the earth and other conditions became suitable, then the mixture began to live—just as naturally as a mixture of certain substances produces an explosive, or an electric battery, or anything else that exists. We admit, of course, that no man has yet succeeded in mixing up really non-living substances to produce living substances or creatures. However, some scientists believe that nature (or God through nature) is doing that very thing all the time, perhaps on other planets as well as on the earth. They think that life simply had to appear on the earth when conditions became suitable and the ingredients came into contact properly.

No Trace of Life in Oldest Rocks

All traces of the first living creatures disappeared soon after their death. The oldest known rocks do not show any clear traces of living creatures although they contain graphite and limestone. This graphite may have been made up of the dead bodies of plants. The limestone may have been formed of the shells of little animals. Many scientists think these rocks are composed of inorganic chemicals only. Nearly all later sedimentary rock layers contain the recognizable shells or skeletons of animals but these oldest layers do not. This is almost conclusive proof that at one time there were no animals or plants on the earth at all or at any rate only very simple kinds.

The Age of Simple Ocean Plants and Animals

Above these oldest layers of rock there are other layers which contain fossils of many different kinds of ocean invertebrates (animals without backbones) such as corals, sponges, crustaceans (lobster-like creatures) and shell-fish as well as fossils of sea plants. From studying this kind of rock the geologists have decided that there was once a time when there

were no animals or plants on the earth except those which lived in the ocean and that there were no animals as complex as fish, much less any reptiles, birds, mammals, or men.

Age of Fishes

In still higher and newer rock layers there are skeletons of fishes but of no other vertebrates (backboned animals). There are layers of these rocks hundreds of feet thick containing the remains of so many fishes that the period in which these rocks accumulated has been named the age of fishes. Here are found the remains of a few amphibians (animals that are born in the water as frogs are, but when grown live on land and breathe air). The scientists claim that these amphibians were the descendants of fishes. Just how some fishes became changed into amphibians it is difficult to prove. Some think this evolution took place in parts of the sea that were so shallow that they were very muddy. *Perhaps some of the fish were stranded part of the time—not long enough to kill them, but long enough and often enough to develop a race of creatures that were half fish and half land animals.*

Age of Amphibians

After a time these amphibians became numerous. The skeletons of many different species of them have been found. They succeeded the fishes as the highest race of creatures on the earth. An examination of the rocks containing their fossil remains makes men think there were many swampy regions at that time. This was the age of coal formation. We have already explained the making of the coal beds of the earth. We have mentioned the alternate raising and lowering of the districts where the coal-making plants grew. Does this same raising and lowering of the land explain the development of the frog-like and salamander-like amphibians out of some kind of partly stranded fishes? Were these creatures making an effort to adapt themselves to their changing surroundings? Did some of the water-breathing fish de-

velop lungs that could breathe air? Yes; that is what we think. What gave them the power to change their bodies? This we can't very clearly explain yet.

Age of Reptiles

After this age of amphibians and swampy coal-making plants, came an age of reptiles. The skeletons of many kinds of reptiles have been found in the rocks of this age. There are small skeletons and large ones. Several have been found sixty feet long. Some of the teeth of these reptiles are blunt and suitable for eating leaves or other parts of plants. Other reptiles had sharp fang-like teeth and must have killed and eaten other animals. There were land reptiles, swimming reptiles, and flying reptiles. The dinosaurs were perhaps the most interesting of these creatures. You may enjoy reading about them in some geology book like Dana's "Story of the Earth" or in a novel called "The Lost World" by Sir Arthur Conan Doyle.

The remains of plants with true-flowers are present in the rocks of the age of reptiles. So are the oldest remains of birds and mammals. There are close resemblances between the skeletons of birds and reptiles. Furthermore, birds are egg-laying creatures as are most reptiles. The conclusion that birds sprang from some kind of reptiles is perhaps correct. Some reptiles whose skeletons were found in these same rocks did not lay eggs, however; their young off-spring were born alive as are those of mammals. This points to the theory that some kinds of reptiles developed into the first crude and small mammals.

Age of Mammals

Gradually these giant reptiles died out. It may be that there were important changes in the earth's climate. There were also tremendous wrinkling movements in the rocks of the earth such as those that squeezed up the great ranges of the Rocky Mountains in North America, the Andes in South

America, and the Himalayas in Asia. For some reason nearly all of the large species of reptiles died out. Instead of the skeletons of reptiles, those of mammals are most abundant in the next rock layers. There seems to have been a period when mammals, too, grew to giant proportions. There once lived mammoths much larger than our elephants, large saber-toothed tigers, giant sloths, and many other species of large mammals. At the same time, however, the ancestors of our present day horses were very small; they gradually increased in size and at the same time their feet gradually changed from five-toed feet to single toed hoofs.

Age of Apes and Men

Finally there developed creatures on the earth that were ape-like in character. From these, we believe, other species developed. From some ape-like race it is thought that both the human race and the highest races of apes such as the gorilla and chimpanzee developed. It is said that every kind of bone in a man's body is present in a gorilla's; that they occupy exactly the same place in the skeleton; that each bone shows the same leading features; and that the differences relate merely to proportion, size, and detail. Shall we not conclude that the gorillas are the distant (or near) cousins of the human race?

Some half million years or less ago, a race of walking apes gradually took on human characteristics, it is thought. Here was a new race of animals which has by its cunning and co-operation seized rulership over all the other creatures of the earth and learned to control many of the forces and resources of nature, until there are left very few corners of the earth where its cities, farms, or mines are not in evidence, or where its wagons, ships, trains, automobiles, or air-planes do not journey. The rest of our story deals with the doings and thinkings of human beings. Compared to the millions of years of time before they came into existence, the scant half million years in which men have lived on the earth is very short. What

changes will appear in the long ages to come we can only guess at or dream about. Perhaps some millions of years from now other races of beings may find our civilization in ruins, just fossils of what they may deem an ancient and rude existence of ancient and rude creatures.

Many Details of Evolution Unsolved

Although the *fact* of evolution is today undisputed by scientists, they do not know the details as to exactly how the process works. It is hard to prove the relative importance of heredity in contrast with environment, of gradual minute changes in contrast with sudden leaps of progress, of mere chance as opposed to a directing "urge," etc. We cannot yet be sure of *the* cause or *the* method of evolution.

Darwin's explanation of the causes of evolution was as follows:

So many creatures are born into the world that there is a constant "struggle for existence" not only between the different kinds of animals and plants, but also between the individual members of each species or variety. There is not enough food and space on the earth to allow all young animals or plants to live to maturity and produce offspring. All the individuals of a species always have some differences and variations, however slight. The individuals that survive are those that are best adapted to live in the environment that happens to surround them. This may be called the "survival of the fittest." The advantageous conditions of structure and physiology of those plants and animals that grow to parenthood are transmitted to their young. Thus to ever-changing natural environment is due the wonderful variety of living creatures with their exquisite adaptation of parts and functions for living in their own peculiar natural surroundings.

Darwin called his theories an explanation of evolution by "natural selection." He explained his views in a book called "Origin of Species" which he published in 1859. Later scientists think his explanation is not complete. They do, however, believe in evolution just as firmly as Darwin did. To

say that "Darwinism" is not an altogether satisfactory and complete explanation of the process of evolution does not mean that the truth of evolution is at all denied.

At the present time many scientists believe that one of the chief factors in evolution is a mystic force within living matter which enables it to direct its own evolution. Another theory widely accepted today is that of the origin of species by "mutations," or sudden new fixed changes, such as one sometimes sees when freaks called "sports" are born. A sport is a freak, such as a child with six toes or an animal or plant with some unusual characteristic. In order for these sports to cause the evolution of new species the new characteristic would have to be transmitted to the offspring of the new individual. Many scientists deny that this is a satisfactory explanation of the process of evolution.

Thus we see that it must be admitted that scientists do not know the whole truth about evolution. However, they are learning more about it every day.

CHAPTER FOUR

HOW ANCIENT SAVAGE MEN BECAME CIVILIZED

"Our reverence for the nobility of manhood will not be lessened by the knowledge that Man is, in substance and in structure, one with the brutes, for, he alone possesses the marvelous endowment of intelligible and rational speech, whereby, in the secular period of his existence, he slowly accumulated and organized the experience which is almost wholly lost with the cessation of every individual life in other animals; so that, now, he stands raised upon it as on a mountain top, far above the level of his humble fellows, and transfigured from his grosser nature by reflecting, here and there, a ray from the infinite source of truth."

T. H. Huxley.

All Races of People Probably Descended from One Parent Stock

We have said that leading scientists believe the human race is descended from creatures best described as walking apes. It is generally thought that the first men developed somewhere in Asia at least 150,000 years ago. It is thought that all the present races of men are descended from one parent stock; however, it is claimed that there lived in Europe several thousand years ago a race of men that were of an entirely different species; that is, it is thought they could not intermarry with true men. A few of their skeletons have been found in Germany, Belgium, France, Spain, and Croatia, while implements thought to have been made by them have been

found in Poland, Russia, and Asia Minor. These people have been called Neanderthal Men because their remains were first found in the Neanderthal Valley in Germany. There is evidence that they existed in Europe for many thousands of years. During much of this time the climate of Europe was warmer than it is now. However, about fifty or a hundred thousand years ago there came a period when the northern part of Europe and America as well as the mountain ranges in other parts of the earth were covered with snow and ice. In fact, geologists think there have been five or six of these glacial periods during the last million years. During the last of these periods of cold climate it seems that the Neanderthal men lived in caves in Europe. They learnt how to kindle fire and to make hearths. They ate the flesh of bison, horse, reindeer, mammoth, and other animals. Some of them may have believed in immortality, for, in at least two cases the skeletons have been found buried with their implements, paints, and food, indicating that their friends thought these things would be useful to the "spirits" of the dead.

It is thought that true man developed further east than these Neanderthal people, and, maybe, earlier. Some scientists think that the Neanderthalers were a sort of degenerate off-shoot of the true human species. The true men probably spread out from Asia or Northern Africa in all directions, for old stone implements similarly made have been found in many parts of the earth. Indeed, more of our knowledge of ancient men has been gained from their implements than from their skeletons, the great majority of which disappeared after these old people died.

The vast majority of remains of former creatures are those of sea animals and plants. The land animals, including people, were usually lost unless they were drowned. It is thought by some that the first true men migrated slowly into Europe and killed off all of the Neanderthalers. That may be true. One of the outstanding features of human history has been the spreading out of waves of men from over-populous centers and the conquest of newer districts. There have been many

waves of migrating and conquering humanity since this first wave of savages. This first wave filtered through the wilderness and subdued the wild animals. In later times, after parts of the earth became somewhat crowded, human waves, being desperate for want of food, new homes, or other desires, often found it easy to overpower more civilized but less warlike peoples. Often the conquerors have settled down in the homes of the people they have conquered and reduced them to a servant class, at the same time learning the useful arts of civilization from them.

Thus even through the sufferings of wars the race has been progressing for thousands of years. Some people even believe that war is necessary to human progress. They may be right in saying that we shall never abolish war; but I, for one, believe the human race must, and will, make a prolonged effort to abolish war.

The Old Stone Age

Stone implements believed to be three or four hundred thousand years old have been found in the gravel beds of Europe. These are much older than any known human skeletons. Perhaps these old implements were made by creatures whose skulls were more like apes than those of present day men. It is said that present day apes sometimes carry clubs and use stones for such purposes as breaking open shells. It is claimed that the first men must have used clubs and unshaped stones for their first implements. At any rate men learnt a long time ago to shape implements out of stone, usually flint. For perhaps a hundred thousand years this was done by striking one piece of flint against another. This period is called the Old Stone Age.

Perhaps the oldest bones of a man-like creature are those found on the island of Java. They consist of the upper part of a skull, three teeth, and a thigh bone. This creature had a brain larger than that of apes, but smaller than that of a human. The thigh bone shows evidence that the creature walked erect. No implements of any kind were found near it.

It has been given the name *Pithecanthropus Erectus* or Walking Ape-man.

The remains of a kind of creature called *Eoanthropus* or Dawn-man have been found at Piltdown, England, in gravel beds in such positions as to lead scientists to think he existed long ago before the last ice-age when the hippopotamus lived in England. It is thought that the Dawn-man chipped flint stones into rude tools.

The jaw bone of a being called the Heidelberg man has been found near Heidelberg in Germany. This was found 80 feet beneath the surface in a sand bed deposited by a river; so it may be over 200,000 years old. The teeth are distinctly human but the jaw bone resembles that of a powerful ape. This Heidelberg man had no chin and possibly was closely related to *Eoanthropus*.

We have already mentioned the Neanderthal men whose remains exist in various parts of Europe and who for hundreds of generations lived in the wilderness of Europe.

Sometime about 20,000 years ago the Neanderthals were killed off or at any rate seem to have disappeared. About this time true man appeared in France and Spain. They probably came from Africa or Asia. Scientists expect to find remains of the oldest true men somewhere in Asia or near the Mediterranean Sea. Recently part of the skeleton of a man thought to be a hundred thousand years old was found in Rhodesia, a part of Africa.

The Middle Stone Age

It is said that two races of men, one tall, the other short, appeared in Europe at about the same time. The tall race has been named Cro-Magnon men and the others are called Grimaldi people. The Grimaldi people were short and fat with flat noses somewhat like those of African bushman.

Reindeer and horse were plentiful in Europe in those days, sometimes called the Reindeer Age, and their flesh was much eaten by these Cro-Magnon and Grimaldi people. They made bows and arrows as well as spears. They used bone for awls

and ivory for skewers and ornaments. They wore furs and skins. Their implements and skeletons have been found buried under layer after layer of litter in the caves of Europe. They drew and painted remarkable pictures on the walls of the French and Spanish caves. Reindeer, mammoths, and horses were well drawn. Much color was used; for example, red, brown, black, and several shades of yellow. Little figures of women also were fashioned out of ivory and limestone.

These Cro-Magnon and Grimaldi people are sometimes said to belong to a Middle Stone Age, although many scholars simply place them in the Old Stone Age. They had discovered that by pressing with a hard piece of bone they could chip off a line of fine flakes along the edge of a flint tool thus obtaining a sharper edge than that obtained by the Old Stone Age people who sharpened their flint tools by knocking the chips off with blows.

New Stone Age

About 15,000 years ago men entered what may be called the New or Late Stone Age of semi-civilization. During this period either some new races or direct descendants of the older races *began to dwell in villages* in many sections of Europe, Asia, Africa, and the other parts of the world. Their stone tools were *sharpened* on a whetstone or grindstone. They had axes with handles attached, besides having chisels, knives, drills, saws, and other kinds of tools.

Some of these Late Stone Age people in Switzerland built villages over the waters of lakes upon platforms supported by piles or tree trunks driven into the bottom of the lake. The houses were connected with the shore by bridges which could be removed at night for protection.

Besides living in villages the people of the Late Stone Age progressed in many other ways. They made pottery jars of baked clay. They cultivated fields of millet, barley, and wheat in order to have a convenient supply of seeds which they could crush into flour. They learned to make thread out of flax and to weave coarse cloth. They tamed the sheep, goat, ox, horse, and dog.

Asia Probable Home of Man

The great majority of our domesticated animals came from Asia, and scientists claim this is evidence that the first men lived there. The ox, sheep, goat, pig, fowl, and pigeon are from India. The horse, camel, reindeer, elephant, peacock, goose, and ostrich may be called Asiatic. The donkey, cat, greyhound, mastiff, and guinea-hen were domesticated in Africa. Some varieties of dogs were domesticated in Europe. The great majority of our garden plants are of Asiatic origin. However, the first man may have developed in Africa, and the skull of the ancient Rhodesian man is mentioned as evidence. It is probable that the ancestors of the American Indians migrated from Eastern Asia by way of Siberia, the Pacific Islands, and Alaska into North and South America not so many thousands of years ago. There are said to be resemblances in bodily features and customs between the American Indians, Esquimos, the Chinese, Japanese, and other Asiatic peoples. Some anthropologists and ethnologists (scientists who study the different races of men) have claimed that the American Indians came of *two* parent-stocks, the one round-headed and the other long-headed. It has been argued that the long-headed American Indians are related to the long-headed Europeans of the Old Stone Age, but that the greater part of them, being round-headed, are related to the Asiatic peoples.

However, it is claimed by other scientists that the connection between the American Indians and the people of the old world is so remote that it is impossible to show they are more closely related to the Asiatics than to the Egyptians or Europeans. It is claimed that there is no relation between the native American languages and those of the old world. The American Indians may have developed whatever culture they had without any assistance from old world peoples since the Old Stone Age. Those of North America had no domesticated animals whatever before the time of Columbus. The llama is practically the only American animal domesticated by the natives. Potatoes, pumpkins, and Indian corn

were among the few plants cultivated. The turkey has been domesticated since the coming of the white man to America.

To make a long story short we may say that the evidence points to the fact that all men, white, black, yellow, red, or what not—are from one original stock, but that the various branches have been separated so long and have developed in such different environments that racial differences which have been developing through hundreds and even thousands of generations are very deep-rooted. The development of semi-civilized creatures through generation after generation of ape-like men was a long, long process. Civilization was possible only because the human species possessed the power of speech and a brain capable of true reasoning. The process of civilization has been going on with increasing rapidity. During the last hundred years the pace has carried us farther than the thousand that preceded them. The six or eight thousand years of history in which the human race has been civilized are only a short time in comparison with the many thousands of years in which the human generations were savages struggling in the wilderness slowly but steadily towards the mastery of nature which we have come to possess.

Different Races Vary in Rate of Advancement

There is one important fact that I have not so far made clear. This is the fact that different branches of the human race have progressed more slowly than others. The period called the Old Stone Age does not mean a period of time so much as it does a state of development, a degree of civilization. When Columbus came to America, the Indians were living in a Stone Age civilization. They had practically no domesticated animals. When white men discovered Tasmania, an island south of Australia, the natives there were even less civilized than the Indians which Columbus found. The Tasmanians had never even heard of sowing seed or raising a crop of any kind. They did not know how to make bows and arrows. They did not know how to fish. They did not know how to make pottery jars or dishes by baking clay.

They did not even wear any clothing or live in roofed huts. They could, however, kindle a fire over which to cook their food. They made wooden spears tipped with stone, as well as stone knives, and also cups and baskets woven out of bark. They spoke a simple language, but could not write any messages or any words of any kind. It is thought that the people of Tasmania had been separated from other branches of the human race for fifteen thousand years, or more. As they were for some reason not a progressive people, the last Tasmanians (who died out about forty years ago) were not any more civilized than their ancestors had been fifteen thousand years before. They were still in the Old Stone Age.

Other branches of mankind had graduated from the Stone Age into the Age of Metals, about five thousand or six thousand years ago. (It was probably the Egyptians who first made implements and ornaments of copper.) A great advance came when man began to make tools and weapons of bronze, a mixture of copper and tin, beginning what we may call the Bronze Age. It was not until along about the time of Columbus that the European nations seemed to spurt away ahead of the rest of the world in the race of civilization. They took the lead in science and industry and (naturally, I suppose) soon took to domineering over other human beings. About the time of Columbus, too, the English began to use coal to a great extent in industry and so started the Age of Coal. An Age of Steam or of steam engines began about 1800 A. D. We could call the present time an Age of Electricity. The author prefers to think of our present age as the Age of Science.

There you have a brief story of human progress in terms of its implements and machines of industry.

Early Types of Civilization

It is hard to state where savagery stops and civilization begins. Perhaps we may say that men became civilized and ceased to be savages when they began to live in permanent homes, cultivating permanent fields, and submitting to a common rule with headquarters at some place.

After the cultivation of plants and the domestication of animals was begun, two types of civilization appeared. One type was developed by people who settled down in certain districts and cultivated the fields year after year. They became an agricultural people. They kept various kinds of animals on their farms to add to their supplies of food and clothing and to use for pulling their wagons, carts, and plows. Another type of civilization was developed by people who kept large herds of cattle or sheep. They did not settle down on farms or in villages, but drove their flocks and herds from place to place in search of new pastures. They usually had horses for their own use and to pull their carts and wagons upon which they would carry their tents and all their possessions when they moved from one grazing district to another.

It was the settled farm-owning and city-making people who took the lead in developing civilization. The wandering herd-owning people would naturally be more war-like than the settled folk. Different bands of them would often quarrel among themselves over the good pasture lands. Sometimes a large band of these nomads would conquer a whole district composed of many cities and farms. They would then take possession and rule over the conquered peoples whom they would reduce to a working class, while they would become something like a class of nobility. After several generations, as has been pointed out previously, these nobles would often take up nearly all of the customs of the people whom they conquered. Later other waves of warrior-shepherds might in turn overrun the land.

Early Migrations

The first spreading out of the human race was due probably to the migrations of small family groups. It has been said that in this manner the people of the Old Stone Age spread from Brittany to Tasmania and from South Africa to China—perhaps even to America. Much later, it is thought, centers of New Stone Age culture grew up south or east of the Med-

iterranean Sea. Some think that bands of New Stone Age sun-worshipping people drifted in canoes from Africa, along the southern shores of Asia, out into the islands of the central and southern Pacific even to America, where they may have met groups of the other line of Old Stone Age people who got into America by way of the islands of Northern Asia and Alaska.

Oldest Centers of Civilization

The oldest civilized centers have been supposed to be near the eastern end of the Mediterranean Sea. There were civilized communities in the valleys of the Tigris and Euphrates Rivers, in Egypt, and on the Island of Crete (in the Mediterranean) about 5000 B. C. The civilizations of India and China are also very ancient, but probably sprang up after those of Egypt and the Tigris-Euphrates valley. Scholars don't know very much about ancient India or China yet.

The civilization of the American Indians did not develop until five or six thousand years after that of the first cities of the old world.

In the New Stone Age there were already many different languages. There probably never was a single universal language. Men were already thinking a great deal about things around them. Clans and tribes were developing from smaller family groups. Superstitions and religious ideas and yearnings were becoming more definite. Sacrificing animals, property, and even human lives to please various "gods" and the "spirits" of dead heroes became common. Priests came into existence as masters of religious ceremonies and knowledge. Wars became numerous between tribes. Successful warrior-leaders became chieftains and kings. Trade and peaceful exchange of ideas sprang up also.

Thus began civilization in various parts of the wilderness of the earth.

CHAPTER FIVE

A BRIEF OUTLINE OF HUMAN HISTORY

"Every human institution, every generally accepted idea, every important invention, is but THE SUMMATION OF LONG LINES OF PROGRESS, reaching back as far as we have the patience or means to follow them.

*The historian * * * * will aspire hereafter to find out, not only exactly how things have been, but how they have come about."*

James Harvey Robinson.

Periods of History according to Kinds of Implements Used

The long period of human existence before the invention of writing used to be called the Prehistoric Period because historians knew so little about it. Investigators have recently learned enough about man before the use of writing, however, to cause the name to be a misfit. A better name would be some such one as the Pre-civilized or Pre-literate Period. As we have already told in the last chapter, the development of our savage ancestors towards civilization has been divided by some writers into ages or stages named according to the kinds of implements used. These periods were: (1) The Old Stone Age or Rough Stone Age when men used only rough stone tools without handles. These implements were shaped into fist-hatchets, etc., by knocking other stones against them. (2) The Middle Stone Age when men learned to shape flint tools by chipping flakes from the rock by pressing a bone or other hard substance into the edge. (3) The New Stone Age or Late Stone Age which represents a state of semi-civilization when men had ground or polished stone implements, dwelt in houses, made wooden furniture, baked clay pottery,

wove cloth of flax, cultivated grain, domesticated cattle, etc.

About 5000 B. C. men first began to make implements of metal such as copper, tin, etc. The whole history of man since that time could be called the Age of Metals. However, since there have been many stages of progress during this time, it would be better to make several periods of this instead of one. As early as 4000 B. C. it was learned that mixing copper and tin produced a substance much harder than either of these metals. This mixture is called bronze. The Bronze Age is usually the same as the first period of civilization in ancient nations; for, when ancient peoples progressed enough to use bronze for their implements, they usually, also, had an organized government, a written language, and other achievements of true civilization. Sometime after the discovery of bronze men learned to make tools and weapons of iron. It is thought that the Hittites of Asia Minor first made implements of iron sometime after 1000 B. C., thus beginning the Age of Iron. Not until over three thousand years later did the use of coal and steam make any radical changes in industry. Then came the Age of Coal followed by the Age of Steam. The great change in industry from the manufacture of articles by hand in the homes to making them by machines in factories has been called the *industrial revolution*. The last short space of one hundred and fifty years has witnessed an almost entire change of life in the civilized world as a result of the factory system of manufacturing articles. We are still living in this Age of Machinery. Nowadays electrical power is used for so many purposes that some writers call our present time the Age of Electricity. As has been said before, the author's choice of a name for our present time is the Age of Science.

Periods of History according to Custom in History Text Books

Most writers simply divide human history into three parts: ancient history, medieval history, and modern history.

Ancient History includes the story of mankind from the

earliest beginnings to the downfall of the Roman Empire, about 400 A. D.

Medieval History extends from the disruption of the Roman Empire to the discovery of America (from about 400 A. D. to about 1500 A. D.).

Modern History began with the discovery of America and extends to the present time.

Each of these three main divisions may be divided into several subdivisions. In order to give our readers a bird's-eye view of history the rest of this chapter will be devoted to the briefest possible statement of the main events of the different periods of ancient, medieval, and modern history. Of course an adequate history of the world cannot be written in one chapter. However, the author has long felt that a one-chapter outline of history would help the average person to a better understanding of the relationship between the different nations and historical periods.

Egypt, the Home of Civilization

In many ways the story of the narrow valley of the Nile River, which is called Egypt, is the most interesting chapter in history. From its temples, tombs, papyrus manuscripts and other records we can trace an almost continuous story of human progress from the Old Stone Age to the present day. Other parts of the world have, of course, been continuously occupied by man, but the records of their lives and deeds have been destroyed or obscured a great deal by the destructions of time or neglect.

In Egypt, too, the problems of mankind for the future are very plainly indicated. Here we see now the threat of future struggles between the conquering nations of Europe and the various races of Africa and Asia which the Europeans now rule over. The necessity for cooperation between races, religious toleration, education of the masses, the conservation and control of human and natural resources, and just regulation of dealings between nation and nation as well as between man and man cannot be overlooked as subjects that must be

immediately considered by a large part of the human race.

All histories of Egypt point out the obvious advantages of the warm and fertile Nile Valley as a home for human beings and suggest them as reasons why this was one of the first districts where men settled down and built up little communities that became centers of civilization. For here wandering, savage human families ten or fifteen thousand years ago found a delightfully warm climate, fertile soil in which food could be grown easily, and an unfailing supply of water furnished by the Nile. Herodotus, the ancient Greek writer and traveler, called Egypt "the gift of the Nile." In Egypt it hardly ever rains except near the coast of the Mediterranean Sea, but every summer owing to the rains and melting snows in the mountains far down in Central Africa where the Nile rises, the river overflows its banks. Since the beginning of civilized times the Egyptians have had irrigation canals and reservoirs which have enabled them to cultivate land even at a considerable distance from the river. Over the land actually inundated by the waters of the river a covering of mud is left after each period of overflow. This makes the black soil of Egypt famous the world over for fertility. It is said that the word, Egypt, means "black soil." The evidence and remains of true civilized life date from about 5000 B. C. when there were just beginning to grow up villages and cities with a chieftain or king as the ruler of each. Step by step the little brown savages progressed towards civilization. They learned to build houses, to sow and cultivate grain, to domesticate animals, to bake pottery vessels. It was a great advance when they discovered how to make bronze implements.

Finally they invented writing. At first they used a kind of picture writing called hieroglyphics which they carved on their tombs and sometimes used for writing in ink on papyrus paper which they made by pressing the stems of papyrus reeds together in layers.

As you might expect, the first villages or cities were independent of each other. The most famous cities of ancient Egypt were Memphis and Thebes. For hundreds, perhaps

thousands, of years the various villages lived under separate chieftains who probably fought a great deal among each other before any one chieftain conquered enough cities to be called a real king. This period of city kingdoms lasted in Egypt from about 5000 B. C. to about 3400 B. C. when a ruler named Menes made himself the first king of Egypt.

We can't be sure as to just when Menes lived. Some historians, notably Prof. J. H. Breasted, think he lived about 3400 B. C., while others calculate that he lived before 4000 B. C. At any rate it is agreed that he began a period of union and prosperity for Egypt which lasted several hundred years. This period is called that of the Old Kingdom of Egypt and it lasted from about 3400 B. C. to about 2100 B. C. During most of this long period (over 1000 years) Memphis was the chief city.

The kings of Egypt were called pharaohs. They were so powerful that the common people thought of them as gods. Naturally, they lived in large houses or palaces; and it is said that the word, pharaoh, originally meant "The Great House." The first list of the kings of Egypt was made by Manetho, a priest who lived 3000 years after Menes. It is, of course, not entirely correct or complete. Manetho divided the pharaohs into family groups, or dynasties. It was during the third dynasty that the Egyptians first began to use stone for building, and it is thought that the pyramid tomb of Zozer who lived about 3000 B. C. is the oldest stone building in the world that still stands. Right after his time there came a period of such rapid progress that within a hundred years the kings and nobles were building such wonderful tombs as to make us compare them with even the greatest modern buildings. This remarkable century of progress can truly be compared with our last hundred years during which science has changed the life of a great part of mankind.

The largest of all these old tombs was the great pyramid of King Khufu, or Cheops, built about 2900 B. C. at Gizeh. It is over 750 feet square at the base and is made up of over 2,000,000 blocks of limestone weighing about two tons each.

It took many years to build this vast monument, and perhaps a hundred thousand workmen toiled on it.

Many of these old tombs were decorated with pictures and hieroglyphic writings telling about the greatness of the kings and nobles. It is from such pictures and inscriptions that we have learned nearly all that we know about the Egyptians. From them we can tell how they dressed; how they traded and fought; what their implements, furniture, houses and ships looked like; how they farmed; what they ate; how they worshiped; and even how they entertained each other with games, music, and dancing.

Under the Old Kingdom the Egyptians made slow but steady progress in architecture and art; the manufacture of cloth, furniture, jewelry, etc.; in irrigation and agriculture; ship building and commerce; and even in medicine, surgery, surveying, and astronomy. Long before the time of Menes they discovered that our years are about 365 days long. They divided the year into twelve months of 30 days each and had an extra holiday week of five days.

The influence of the priests and their religious ceremonies also increased. Some cities had such fine temples and festivals in honor of their favorite gods that people from all over the country visited them. Some of these deities were thought of as gods of all of the Egyptians instead of merely to be worshiped by the people of one city. Most of their religious beliefs, however, we would call mere superstitious worship of imaginary spirits, sacred animals, the sun, the Nile River, etc. Recent discoveries show that the priests fooled the people by means of remarkably clever talking idols.

The Tigris and Euphrates River Valleys

Across the Arabian Desert and a thousand miles east of Egypt another center of civilization sprang up in the valleys of the Tigris and Euphrates Rivers which empty into the Persian Gulf. At a certain time of the year these rivers overflowed their banks as the Nile did; and, so, the people who lived there learned to build dykes and canals like those of

the Egyptians. Here, too, they learned to make bricks and pottery, to weave cloth, and to make implements of copper, bronze, and gold. They developed into a truly civilized community as early as 5000 B. C. or about the same time as the Egyptians. It seems almost certain that these two early civilizations sprang up independently and flourished for a thousand years or more without the one knowing about the other.

The southern part of the two river valleys is called Babylonia or Chaldea. In very early times Akkad, Ur, and other cities fought each other for supremacy, but after a time they were all eclipsed by Babylon. The upper valley of the Tigris was called Assyria and the chief city was Nineveh. Between the upper Tigris and the Euphrates stretched the great plain called Mesopotamia, a name made up of two Greek words meaning "between the rivers."

It is thought that the earliest Chaldeans came from the hills near the Caspian Sea. They are called Sumerians. Their hold on the land was early disputed by the Semitic tribes who came in from the Arabian Desert. Several of these tribes settled down in Babylonia taking up and advancing the civilization of the Sumerians.

At first the Babylonians had a kind of picture writing. But in addition to using rolls of papyrus paper they scratched or stamped their words on moist bricks and then baked them or let them dry in the sun. They made the characters with a sort of "T" shaped nail or stylus which they pressed into the soft tablets. This writing reminds one of the tracks of birds. It is called cuneiform or wedge-shaped writing because it is made up of a series of wedge-shaped marks left by the stylus.

There was a long period of warfare between the small city kingdoms of Babylonia like that of the early Egyptians. Ur was the chief Sumerian city while Akkad and Babylon were the chief Semitic cities. We know little about their chieftains and kings until about 2800 B. C. when Sargon I, a Semitic King of Akkad, conquered and ruled over the world's first empire. He not only ruled over Babylonia proper but Meso-

potamia also and is said to have marched to the banks of the Mediterranean Sea and even to have crossed to the Island of Cyprus.

Sargon built up his empire long before the Egyptian pharaohs ventured to lead their armies out of Egypt, but soon after his death Akkad declined and there followed several hundred years which we know little about. There seems to have been much warfare but at the same time wonderful advances in civilization.

About 2100 B. C. a band of Semites came in (probably from Arabia) and made Babylon their capital. Their most famous king was Hammurapi, or Khammurabi, who began the First Babylonian Empire. Then for century after century Babylonian laws, religious customs, and manufactures were spread far and wide toward Syria on the west, India on the east, and the shores of the Black and Caspian Seas on the north. Many Babylonian goods and ideas were exchanged for those of the Egyptians, and even those of the Greeks.

The Babylonians contributed a great deal to civilization. They invented carts with wheels; they knew how to use levers and pulleys, and how to construct arches; they first set aside every seventh day as a sabbath (and hence invented the week); first divided the day into hours and minutes, and invented several kinds of sun dials and water clocks; manufactured beautifully colored muslin and woolen cloth, including fine tapestries and carpets; and they first foretold eclipses. They began, also, the superstitious teachings of astrology, thinking that future events could be predicted by a study of the stars. Some people today still believe in some of this foolishness.

Beginning of Civilization in Other Countries

In the meantime peoples in other parts of the world were developing civilized communities of their own. Among these were the Assyrians, Phoenicians, Hebrews, Greeks, Chinese, Aryans of India, etc. We shall take the space to tell about only one of these, the Hebrews. They probably migrated

from Ur in Chaldea to Palestine about 2000 B. C. According to the Old Testament they were led by Abraham. The Book of Genesis says that Abraham was succeeded by his son, Isaac, and his grandson, Jacob (or Israel). Later the Hebrews came to be called Israelites (Children of Israel). Leaders such as Abraham, Isaac, and Jacob ruled over just small bands of wandering, shepherd people. They were called patriarchs or "Ruling Fathers." Jacob, or Israel, was said to have had twelve sons, supposed by some to have founded the twelve tribes of Israel. One of these sons was Joseph who was said to have gained permission of the pharaoh of Egypt to allow his kinsmen to settle in northern Egypt. The account goes on to say that after several hundred years the Hebrews were led out of Egypt to the region of Mt. Sinai by Moses and that there he gave them their early laws, including the "Ten Commandments." These Ten Commandments undoubtedly form one of the most wonderful codes of laws in history. They forbid theft, slander, adultery, covetousness, and the worship of idols or of any other god but Jehovah; and they enjoin loyalty to one's father and mother and the observance of the sabbath. While the Jews may not have been the first people to observe a sabbath day once a week, yet it is chiefly to them that civilization owes this weekly day of rest from the toil and bustle of life.

The Hebrews again settled in Palestine. They dwelt on the road between Egypt and Babylonia and so became involved in the trade and warfare of those and other nations. An Assyrian king carried off some of them. A Babylonian king took others to Babylon in order to keep them from continually rebelling against his rule. A Persian king who conquered Babylon allowed them to return to Palestine. Here they continued to dwell for several centuries during which time they wrote and collected the wonderful writing which we call the *Old Testament*.

The Persians and Greeks

From 540 B. C. to 330 B. C. Western Asia was united in a vast empire by the Kings of Persia of which Palestine was a

small part. Egypt was partly conquered by the Persians. By this time the Greeks had developed a fresh and truly remarkable civilization of their own. The Persians tried to conquer Greece, but failed, for which historians are all thankful; for the Greeks were interested in science, philosophy, religion, art, and, indeed, contributed as much to the advancement of civilization as any other one nation in history.

We have not space to recount the "Glory that was Greece." A Greek warrior king, Alexander the Great, led a Greek army into Asia in turn and conquered not only all of the mighty Persian Empire, but also Egypt and part of India. After his death his conquests were divided up amongst his generals. Greek ideas and customs were thus spread throughout the civilized countries of that time. Palestine was under a Greek ruler, and the Greek language became prevalent.

The Romans and Christianity

Next arose the Romans. Beginning as a small tribe in Italy they first conquered and united that peninsula. After a mighty struggle they overwhelmed Carthage, which was originally a Phoenician Colony. They conquered Greece much more easily. Their conquests spread entirely around the Mediterranean Sea.

The Romans at first allowed the Jewish rulers to have the title of king. One of them named Herod Antipater was their king when Jesus was born at Bethlehem, near Jerusalem. Jesus attracted very little attention from the rulers of the then mighty Roman Empire. There were many divisions among the Jews and the Herods did not keep order very well, so the Roman emperor decided to abolish the kingship and send a Roman governor or procurator to Judea. Many Jews preached rebellion against the Romans; others such as Jesus and John the Baptist merely preached repentance from sin and a turning away from evil and hypocrisy. Both John the Baptist and Jesus were put to death because they were accused of trying to stir up a rebellion against the Romans and because they broke Jewish customs. It seems that their popularity

and plain criticisms of the Jewish priests made the latter hate them. Jesus talked about setting up a Kingdom of Heaven, meaning a Kingdom of Righteousness, and never sought to be called the King of the Jews as his enemies claimed. He was so kind and had such a wonderful personality that many of the poor and unhappy Jews followed him about to listen to his preaching. He finally went to Jerusalem to preach, but was accused of treason and rebellion. He was condemned by the Sanhedrin or Counsel of Jewish Priests and their decision was approved by Pontius Pilate, the Roman Governor at that time. Pilate said he could find no wrong in him, but sentenced him to be crucified because the leading priests desired it. The twelve chosen assistants of Jesus were called the apostles and his other followers were called his disciples. They believed that he arose from the dead and that he was the promised Messiah or Saviour of the Jews, being the actual son of God. He referred to himself simply as the "son of man."

A few years after the crucifixion of Jesus a brilliant Jew named Saul or Paul was converted to Christianity. He was well educated, spoke Greek, and was a full Roman citizen. He was an eloquent speaker who traveled through Syria, Asia Minor, Macedonia, and Greece, preaching to Gentiles as well as Jews. Often his teachings caused riots, as at Ephesus, where the artisans who made their living by selling images of the Greek goddess Diana, stoned him and drove him out of the city. At the Greek city of Athens his preaching concerning "The Unknown God" aroused little curiosity, since preachers and teachers of all sorts flocked to Athens in large numbers.

However, Paul organized a Christian congregation at Athens and at Corinth, another Greek city. Later he returned to Jerusalem, where his preaching caused a riot. He was arrested. As a Roman citizen he appealed to Caesar, the Emperor at Rome. Therefore he was taken to Rome as a prisoner, which was not entirely displeasing to him, for he had long had a desire to see the capital of the Roman Empire. Little is known about his life in Rome. He was probably

murdered in one of the riots against Jews and Christians while Nero was emperor.

By this time other missionaries were preaching Christianity in nearly every city where there was a Jewish settlement, but they preached to Gentiles as well as Jews. Soon a majority of those who became Christians were non-Jews.

It is interesting to note that the New Testament, which is a compilation consisting of the four Gospels (lives of Jesus) and other writings of his followers, was written in Greek.

In a few hundred years Christianity became the leading religion in the Roman Empire. Finally the emperors adopted it. Next it was made the state or government religion of the empire. The church was divided into geographical divisions under the administration of bishops. The Bishop of Rome became the Pope or head of the Roman Catholics. The Bishop of Constantinople became the head of the Eastern or Greek Orthodox Church.

The "Fall" of the Roman Empire

At last the Roman Empire was invaded by barbarian tribes from Germany and northeastern Europe. They took possession of the western half of the Roman Empire, but the eastern half endured at Constantinople until that city was conquered by the Turks in 1453 A. D. The invading tribes in western Europe plundered its cities and then settled down to take possession of the Romano-Christian civilization there. As a result there gradually developed the modern nations of France, England, Germany, etc. At first the process of the *Evolution* of these nations was so slow that there was a period called The Dark Ages.

Mohammedanism and the Crusades

Beginning about 622 A. D., Mohammedanism spread through western Asia and northern Africa. They conquered Spain and invaded France, but were driven back into Spain.

The seizure of the "Holy Land" by "Infidels" led to the "Crusades" or religious wars during which the Christians tried to reconquer Palestine.

The Discovery of America

The conquests of the Mohammedans eventually helped to bring about the discovery of America, for they greatly hindered the commerce between Europe and Asia which grew to large proportions after the Crusades were over. Columbus, as you know, was searching for a new route to India. Believing in a "scientific" doctrine that the earth is round he discovered America by accident.

The Revival of Learning

About the time of Columbus a Renaissance, or Revival of Learning, occurred in Europe. This began in Italy and was partly caused by the conquest of the Turks. Scholars from Constantinople and the East had fled to Italy, taking with them many valuable books, including those of the ancient Greeks. A great desire for knowledge seemed to spread rapidly over Western Europe. This discovery of new lands aroused great interest. The invention of printing made the spreading of knowledge easier. Many established beliefs were upset by the discovery of new facts that could not be denied. The world was becoming *modern*. The two greatest discoveries, it seems to me, were: (1) it is the duty of science to investigate, test, and prove theories and beliefs before accepting them; (2) everything that exists has come from, or developed from, or *evolved* from something which has preceded it. These two truths are the foundation of modern knowledge and science. We ought to say here that it is not only living forms that have developed as the result of a process of EVOLUTION, but also every existing inanimate thing, as well as all human customs, institutions, and characteristics. Looking at this truth from a religious point of view one might say *evolution* is the universal process through which God or the Directing Force of the Universe works.

The Age of Exploration and the Protestant Reformation

From 1500 A. D. to 1640 A. D. came a period which we will call the Age of Exploration and Settlement of the New World by Europeans. It might also be called the Period of

the Protestant Reformation in Europe. In 1519 Martin Luther, a German monk, denied some of the teachings of the Catholic Church. This led to the beginning of Protestantism. The word Protestant means one who protests against these teachings. Soon there were Protestants in many countries besides Germany. At the present time there are many kinds of Protestants, such as Lutherans, Presbyterians, Methodists, Baptists, etc. Under this heading we might also include Unitarians, Christian Scientists, and other religious denominations that have sprung up in recent times.

Wars for Empire

Between 1648 A. D. and 1789 A. D. there were several great European wars. The nations of Europe, especially England and France, were fighting for possession of colonies all over the world. In one of these wars England overwhelmed France and secured undisputed control of nearly all of North America as well as the great Empire of India. The nations were also scheming to extend their boundaries at home in Europe. Often when one nation threatened to get hold of a large amount of territory other nations would combine in order to keep the "balance of power." Religious hatred between Catholics and Protestants continued to cause riots, massacres, and wars. A somewhat unexpected event of this period was the successful winning of independence by the United States of America from England. Up to this time the nations of Europe had looked upon their colonies almost entirely as a source of wealth and power for themselves. The Americans said that they would not "pay taxes to England since they were not represented in the English Parliament." The French Government assisted the Americans in order to "get even" with their enemy, England, although Lafayette and other "friends of liberty" fought with them for better reasons.

The French Revolution and Napoleon

Partly inspired by the success of the Americans the common people of France now started a revolution of their own against the tyranny of the French monarchy and nobility

which had kept them in poverty and used them for "cannon fodder" for centuries. They set up a republic, beheaded the king and queen, invited other nations to get rid of their kings also, and got into war with England, Austria, Prussia, the Protestant Netherlands, Spain, Portugal, Sardinia, Tuscany, Naples, and the "Holy Roman Empire." The enthusiastic armies of the French Revolutionists were astonishingly successful. They quickly overran the Netherlands and Spain. Soon a wonderful general, Napoleon Bonaparte, won fame by conquering Italy. After a futile trip to Egypt from which he expected to march on to India, Napoleon returned to Paris and "persuaded" the French Government to let him draw up a new constitution. So he became "First Consul" of France and started off on his schemes to conquer Europe. In 1804 he became bold enough to call himself "Emperor." He conquered and ruled over more than half of Continental Europe. England, whose navy "ruled the seas," was the chief opponent of Napoleon. She sent an army into Portugal and Spain under the command of an able general, later given the title of the "Duke of Wellington." When the Russian Czar refused to quit trading with the English, Napoleon invaded Russia and marched to Moscow. The Russians burned that city and destroyed their fields in order to starve out Napoleon's army. He had to start home in the midst of winter and nearly all of his army perished from hardships or the guns of the Russians. The conquered nations now rose against him, and he was soon driven to the very gates of Paris. He surrendered to the allies and was allowed to go as a virtual prisoner to the Island of Elba in the Mediterranean Sea. The brother of the former French king was proclaimed King Louis XVIII. This was in 1814. Louis tried to restore all the old conditions; but this caused a great deal of dissatisfaction among the French people, many of whom had profited by the advances and reforms that came during the revolution and under the regime of Napoleon who had administered French affairs with considerable efficiency. In 1815 he suddenly set out for Paris.

His old soldiers joined him as soon as they heard about this and by the time he reached the French capital he had such a large army that Louis XVIII fled. Napoleon then prepared to attack the allied armies which were still near the border between Belgium and France. At the famous battle of Waterloo he was totally defeated. He fled to the west coast of France where he surrendered to the captain of an English ship. This time he was sent to the Island of St. Helena in the South Atlantic where he died in 1821.

The Nineteenth Century

In 1815 the nations which had been allied against Napoleon held a congress to draw up treaties for the purpose of keeping peace and preventing revolutions. Later some of the kings made a special agreement to help each other in case any of their subjects threatened their power.

In spite of the destructions of war a new era in history was dawning. Hargreaves and Cartwright had invented machinery for manufacturing thread and weaving it into cloth. James Watt had invented the steam engine, Eli Whitney the cotton gin, and Robert Fulton the steamboat. Factories of various kinds began to spring up and what we have called the Industrial Revolution was taking place. Geologists and other scientists were working out the theory of evolution.

It is impossible to mention all of the great achievements of the Nineteenth Century. You know the story of the telegraph, the locomotive, the telephone, the electric light, and other wonderful inventions. The rapid spread of the factory system caused great changes in human life such as the growth of great manufacturing cities, a struggle between capital and labor over wages and conditions in industry, etc. The progressive nations of the world were enabled to manufacture more articles than they needed for their own uses and began selling them to peoples in other parts of the world. This caused a great increase in world commerce. Nations possessing great colonial empires, such as England and France, sold their manufactured goods to their own colonies. Some manufac-

turing countries, such as Germany and Italy, had few colonies. They, too, had goods to sell and were, perhaps, envious because they did not have a large enough "place in the sun." This commercial rivalry added to all the old national and racial prejudices caused the European nations to develop large armies and navies in case they had to "protect their rights." By the beginning of the Twentieth Century, Europe was an "armed camp."

The World War

The horrors of the Great War almost surpassed human imagination. All the great achievements which scientists had produced for the betterment of civilization were turned to the destruction of human life. Treaties became "scraps of paper." The furies of prejudice and hatred burst forth with all the brutishness of primitive savagery.

When the smoke of battle had cleared away, humanity breathlessly counted the cost and cried out in agony, "This must not happen again."

The Problems of Today

A recent history text-book, *Our World Today and Yesterday*, by Robinson, Smith, and Breasted, contains the following statement:

"There are at least four great problems that face mankind: (1) our *education* must be so improved that we shall understand our world and ourselves better and be in a position to make the best use of the great discoveries which are constantly going on; (2) our *business methods* and our ways of *making and distributing commodities* and *dividing up the profits* of manufacture and trade must be rearranged so that the most and best things possible will be furnished to the greatest number of people at the least cost; (3) *government* must be run with wisdom and understanding and without graft and dishonesty; (4) the *fearful hazard, suffering, and expense of modern warfare* must be in some way done away with by creating friendly relations between the nations of the earth, who are nowadays so dependent on one another and have so many interests in common."

STEPS IN HUMAN PROGRESS

2000,000 A.D. ?

200,000 A.D. ?

20,000 A.D. ?

1925 A.D. - 2000 A.D. ? CAN HUMANITY ABOLISH WAR, POVERTY, CRIME, DISEASE, RELIGIOUS PREJUDICE, RACE HATRED ETC. ?

1918 A.D. TO 1925 A.D. A FRIGHTENED BUT EVER-JEALOUS AND PREJUDICED HUMANITY TRIES TO REORGANIZE THE WORLD.

1914 A.D. TO 1918 A.D. WORLD WAR OF ALLIED NATIONS AGAINST GERMANY, AUSTRIA, TURKEY, AND BULGARIA LEAVES EUROPE BANKRUPT AND CIVILIZATION IN DANGER OF DESTRUCTION.

1915 A.D. TO 1914 A.D. CENTURY OF WONDERFUL SCIENTIFIC, INDUSTRIAL, AND POLITICAL PROGRESS, ACCOMPANIED BY INCREASED RIVALRY OF NATIONS FOR COMMERCE AND EMPIRE.

1789 A.D. TO 1815 A.D. FRENCH REVOLUTION AND ATTEMPT OF NAPOLEON TO CONQUER THE WORLD.

1648 A.D. TO 1789 A.D. STRUGGLES OVER BALANCE OF POWER BY EUROPEAN NATIONS; ALSO WARS FOR COLONIAL EMPIRE; UNITED STATES WIN INDEPENDENCE AND ESTABLISH FEDERAL CONSTITUTION.

1500 A.D. TO 1648 A.D. AGE OF EXPLORATION AND SETTLEMENT OF NEW WORLD BY EUROPEANS; THE PROTESTANT REFORMATION IN EUROPE.

1300 A.D. TO 1500 A.D. CONQUEST OF W ASIA AND S.E. EUROPE BY THE TURKS; THE RENAISSANCE, OR REVIVAL OF LEARNING IN W EUROPE, DISCOVERY OF AMERICA; PORTUGUESE VOYAGES TO INDIA.

800 A.D. TO 1300 A.D. AGE OF FEUDALISM, CRUSADES, AND HOLY ROMAN EMPIRE; EASTERN EMPERORS STILL AT CONSTANTINOPLE; MOHAMMEDAN POWER CONTINUES; EARLY BEGINNINGS OF ENGLAND, FRANCE, ETC.

395 A.D. TO 800 A.D. THE BARBARIAN INVASIONS AND DARK AGES IN W. EUROPE; RULE OF EASTERN EMPERORS AT BYZANTIUM (CONSTANTINOPLE); RISE OF PAPACY; BEGINNING OF MOHAMMEDANISM.

30 B.C. TO 395 A.D. LEADERSHIP OF ROMAN EMPIRE; BEGINNING AND SPREAD OF CHRISTIANITY.

146 B.C. TO 30 B.C. LEADERSHIP OF ROMAN REPUBLIC OVER ALL COUNTRIES BORDERING ON THE MEDITERRANEAN SEA.

330 B.C. TO 146 B.C. PREDOMINANCE OF GREEK CULTURE IN EASTERN EUROPE, WESTERN ASIA, AND NORTHERN AFRICA; STRUGGLE BETWEEN ROME AND CARTHAGE FOR RULE OF W MEDITERRANEAN.

540 B.C. TO 330 B.C. WESTERN ASIA UNITED INTO A VAST EMPIRE BY PERSIA; RAPID SPREAD OF GREEK AND ROMAN INFLUENCE ALONG COAST OF MEDITERRANEAN SEA; PERSIANS FAILED TO CONQUER GREECE; BEGINNING OF BUDDHISM IN INDIA.

2400 B.C. TO 540 B.C. ASSYRIANS, PHOENICIANS, HEBREWS, GREEKS, CHINESE, ARYANS (IN INDIA), AND OTHER PEOPLES DEVELOPED CIVILIZATIONS.

5000 B.C. TO 2000 B.C. EGYPT AND BABYLONIA FAR AHEAD OF OTHER COUNTRIES IN CIVILIZATION, BEGINNING WRITING, USE OF METALS, ETC.

15,000 B.C. TO 5000 B.C. SEVERAL BRANCHES OF THE HUMAN RACE PROGRESSED THROUGH NEW STONE AGE CULTURE, DOMESTICATING ANIMALS AND PLANTS, MAKING POTTERY, ETC.

500,000 B.C. TO ABOUT 15,000 B.C. ALL MEN LIVED IN AN OLD STONE AGE SAVAGERY, USING ONLY RUDE STONE TOOLS.

ABOUT 500,000 YEARS AGO MEN DEVELOPED, PROBABLY DESCENDED FROM SOME KIND OF WALKING APE.

1,000,000 YEARS OR MORE AGO APES APPEARED, DESCENDED FROM SOME UNKNOWN MAMMAL OR OTHER ANIMAL.

THE EARTH HAS BEEN A HABITABLE PLANET FOR AT LEAST 100,000,000 YEARS. DURING THIS TIME SIMPLE CREATURES "EVOLVED" INTO HIGHER PLANTS AND ANIMALS.

Drawn by Marshall Reed

OUTLINE OF HISTORY IN GRAPHIC FORM

Read the steps from the bottom upwards.

CHAPTER SIX

SCIENCE, RELIGION, AND THE FUTURE OF CIVILIZATION

*"Dangers and fears * * * led many of the most astute and incisive intelligences of our time to believe that Western civilization is doomed, and that a new Dark Age lies ahead."
"The unused assets of Western civilization, the unharnessed forces of health, the raw materials of renewal * * * have led a few venturesome minds to believe that the foundations have been largely laid for a new renaissance, and that before long we may see a fresh and fruitful advance of the human spirit."*

Glenn Frank.

Science and Religion

The author of this book cannot believe that there is any necessity for a conflict between religion and modern science. Both earnestly yearn for and strive for Truth. Should not that which is Truth for science also be Truth for religion? Surely neither shall ever claim that either the human mind or the human heart can comprehend the Whole Truth. The unceasing and untiring labors and searches of science will go on and on and stretch further and further into the infinite universe. Adopting and profiting by every advancement and achievement of science the religious yearnings of the human heart will approach nearer and nearer to an understanding of the ways in which the universe is directed by the All-pervading and All-directing Force, the Eternally Mysterious Cause and Essence of Existence which finite man has termed the Infinite God. In the search for Truth science and religion ought to go hand in hand.

Since God and Truth are too infinite ever to be fully attained or comprehended, we ought to admit that no one

religious sect can fully explain The Divine Plan of the Universe.

It has been said by some that the doctrine of evolution is contrary to the religious teachings of the Bible; others maintain that there is no contradiction between the explanation of the development of man as a process of evolution and the account of his creation in the Bible.

We must frankly admit that many scientists claim we are forced to conclude from scientific evidence that the Bible is not more inspired than Charles Darwin's "Origin of Species" or any other great book. They doubt or even disbelieve the immortality of the soul and other teachings of Christianity on the grounds that there is not enough scientific evidence in favor of them.

On the contrary many leading scientists stoutly affirm their loyalty to Christianity and the Bible.

Some religious denominations reject the idea that man is the result of evolution from lower types of life.

Other religious sects fully accept the theory of evolution as the method in which God created mankind. Many Christian ministers have written books to explain how the wording of the Biblical account of Creation fits in with the geological and scientific record of the evolution of life through untold ages from the simplest forms to man.

The Next Step in Evolution

We have said in a previous chapter of this book that scientists who are trying to explain the exact steps by which new species of plants and animals developed do not know to what extent changes took place as a sort of conscious effort on the part of these creatures to adapt themselves to changing environment. What about the present? Can *men* ever consciously and purposefully enter upon controlling their own biological, mental, and social evolution? Such a thing is not inconceivable. Would it not be an inspiring thing to believe that science can enable us to progress on and on to goals which we may take part in selecting?

The Reader Must Think for Himself

This book is not an effort to detract from or promote the advancement of any particular religious creed or sect. The reader must investigate these himself as well as arrive at his own conclusions in regard to the interpretation of the significance of Evolution to religious thought.

It is impossible to include in this book a bibliography or list of references. However, it is the hope of the author that readers will be stimulated to further study and thought. Any Public Library can supply lists of books on the subject of Evolution.

The Future of Civilization

Glenn Frank, recently chosen president of the University of Wisconsin, has recently summed up (in the Century Magazine for July and August, 1925) current ideas on the "Outlook for Western Civilization." He says that on the one hand not only sensationalists but even some of the most thoughtful leaders of our day are fearful lest civilization be allowed to go backward into a new Dark Age. There are, on the other hand, he says, not only the sentimental and conventional optimists but also unillusioned and scientifically trained thinkers who believe that the discoveries of science already made, or about to be made, can, if they are put into active and practical use, bring about a new renaissance.

In a masterly way Dr. Frank lists the fears of the pessimists as follows:

"First, *the biological fear* of racial deterioration resulting from a tendency to reproduce our population from our less and least fit human stocks rather than from our better and best human stocks; second, *the psychological fear* that we are rapidly becoming a crowd-civilization, in which the crowd-mind and crowd-processes of thinking are taking the place of the creative insurgency of the free and disciplined intelligence of the individual citizen; third, *the political fear* that democracy as it comes to the end of its period of quantitative extension and enters its period of qualitative development may fail to pro-

duce a civilization that is at once stable and progressive; that democracy may, like a pendulum, swing between the equally sinister extremes of reckless revolution and reckless reaction; that it may prove only a half-way house on the road to dictatorship, either the dictatorship of the proletariat or the dictatorship of plutocracy; fourth, *the economic fear* that our industrial civilization may court disaster by exalting quantity above quality, by mechanizing a civilization that must be kept human if it is to survive; fifth, *the historical fear* that the life of a people moves in a cycle similar to the cycle of birth, youth, middle age, senescence, and death that marks the life of individual members, and that Western civilization is senescent; sixth, *the administrative fear* that the bigness and complexity of the institutions of our civilization have outstripped the existing administrative capacity of mankind, and that we must either contrive to breed and train more great administrators or reorganize our life in terms of smaller and more manageable units; and, seventh, *the moral fear* that the present younger generation have gone apostate to the sort of standards of thought and conduct upon which alone a stable civilization can be built."

It is the personal opinion of Dr. Frank that these fears, with the possible exception of the historical fear, rest upon indisputable grounds, and that we shall inevitably enter a new dark ages, unless we begin with a decent promptness to remove the legitimate grounds for these fears. Bluntly, he states, furthermore: "We can remove the grounds for these fears only by sheer feats of biological, psychological, political, social, economic, educational, and spiritual engineering."

The author thinks that the word *evolution* could be substituted for the word *engineering* in the last statement.

How shall we set about this stupendous task?

In the first place modern science and thought must discover "how to go about removing the legitimate grounds for these fears."

Religious Membership of the World

Roman Catholics	288,000,000
Eastern Catholics	121,000,000
Protestants	167,000,000
Total Christians	576,000,000
Jews	14,972,000
Mohammedans	227,040,000
Buddhists	140,407,000
Hindus	215,512,000
Confuci and Taoists.....	310,925,000
Shintoists	25,015,000
Animists	161,272,000
Miscellaneous	21,375,000
Total non-Christian	1,111,168,000

Total 3,380,326,000

WORLD TOTALS, PROTESTANT DENOMINATIONAL MEMBERSHIP

Church of England—England, Wales, 2,400,000; Ireland, 576,000; Scotland, 56,000; rest of world, 3,000,000.

Methodists—U. S. and Canada, 7,600,000; British Isles, 1,300,000; elsewhere, 3,000,000.

Presbyterians—U. S. and Canada, 3,700,000; British Isles, 1,933,000; elsewhere, 3,000,000.

Baptists—U. S. and Canada, 7,600,000; British Isles, 408,000; elsewhere, 1,000,000.

Congregationalists—U. S. and Canada, 900,000; British Isles, 490,000; elsewhere, 700,000.

Lutherans—U. S. and Can., 2,500,000; Ger., 42,000,000; Scand., 11,000,000; elsewhere, 8,000,000.

From the World Almanac.

In the second place they must discover “how to set going, nationally and internationally, those biological, psychological, political, economic, administrative, educational, and spiritual forces and policies that will renew, enrich, and create a virile and veracious civilization.”

There are four kinds of “false hopes,” Dr. Frank thinks. These are as follows: (1) the looked-for spiritual regeneration which many thought would come as a more or less automatic reaction from war; (2) the hope that science can prove immortality and secure actual contact with the “spirits” of

the dead through "mediums" and "spiritualism"; (3) the hope that civilization can be renewed only through a return to fundamentalism and a blind faith in its teachings; (4) the hope that humanity must progress inevitably or automatically (Dr. Frank calls this the fatalism of hope).

Many of the discoveries of scientific learning are known only to scientists who work incessantly in their laboratories and libraries. The average person knows very little about them. We see little of the medical researches going on in hospitals and universities, but we can not ignore the marvelous achievements of modern medicine. We cannot see the "Edisons, Pasteurs, and Burbanks of Biology or Psychology or Sociology;" but we can surmise that their accumulated knowledge may be turned to practical use (indeed, they are in daily practical use in agriculture and in the breeding of plants and animals as well as in medicine) so that men may consciously and purposefully participate in and control their own Evolution towards a better and happier humanity.

It is in science and in a religion that will go hand in hand with science that our hopes for the future welfare of humanity rest. If humanity uses and extends science and does not destroy itself by religious, political, or industrial strife, who knows to what heights human progress may attain? Perhaps, as H. G. Wells has said, "A day will come, one day in the unending succession of days, when beings, beings who are now latent in our thoughts and hidden in our loins, shall stand upon this earth as one stands upon a footstool, and shall laugh and reach out their hands amidst the stars."

